

Date: Fri, 11 Jun 93 09:06:58 PDT
From: Info-Hams Mailing List and Newsgroup <info-hams@ucsd.edu>
Errors-To: Info-Hams-Errors@UCSD.Edu
Reply-To: Info-Hams@UCSD.Edu
Precedence: Bulk
Subject: Info-Hams Digest V93 #714
To: Info-Hams

Info-Hams Digest Fri, 11 Jun 93 Volume 93 : Issue 714

Today's Topics:

Digital microwave project (3 msgs)
 Field Day Power.
ft530 rubber resistor: tuned low?
 FTP File Compression Question
 Ham radio in TV shows
 Handi-Ham Address
 HTX-202 error mode
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Intermodulation, dummy-load antennas and HT's
 LOWE SHORTWAVE USERS MAILING LIST forming.
 N connectors for RG-58?
 Signal Strength Formula?
 Velocity of Light

Send Replies or notes for publication to: <Info-Hams@UCSD.Edu>
Send subscription requests to: <Info-Hams-REQUEST@UCSD.Edu>
Problems you can't solve otherwise to brian@ucsd.edu.

Archives of past issues of the Info-Hams Digest are available
(by FTP only) from UCSD.Edu in directory "mailarchives/info-hams".

We trust that readers are intelligent enough to realize that all text
herein consists of personal comments and does not represent the official
policies or positions of any party. Your mileage may vary. So there.

Date: Fri, 11 Jun 1993 14:45:33 GMT
From: swrinde!gatech!howland.reston.ans.net!usenet.ins.cwru.edu!neoucom.edu!
wtm@network.UCSD.EDU
Subject: Digital microwave project
To: info-hams@ucsd.edu

A good reference with which to begin is "The ARRL HANDBOOK for
Radio Amateurs 1993", American Radio Relay League, Newington CT.
1992. LLC 41-3345.

See chapter 32, pages 43 to 56. Use of Gunnplexers for a 10.5 GHz link is described with possible application for a 2 megabit/s data link. Also, you might want to contact a company called Advanced Receiver Research, Burlington CT, (203) 582-9409, which specializes in Gunnplexer equipment.

Be sure to determine if you need to obtain a license to operate in the band of interest.

If you get to the point where you start to undertake the project, be sure that you know the Gunnplexers that you are purchasing. Many of the inexpensive units are continuous wave output on a fixed frequency without the necessary varactor modulating diode.

--

Bill Mayhew NEOUCOM Computer Services Department
Rootstown, OH 44272-9995 USA phone: 216-325-2511
wtm@uhura.neoucom.edu amateur radio 146.58: N8WED/AA

Date: Fri, 11 Jun 1993 15:07:45 GMT
From: usc!howland.reston.ans.net!math.ohio-state.edu!magnus.acs.ohio-state.edu!
usenet.ins.cwru.edu!news.uakron.edu!neoucom.edu!wtm@network.UCSD.EDU
Subject: Digital microwave project
To: info-hams@ucsd.edu

In article <dmcreyne-110693082520@134.5.142.4> dmcreyne@hercii.lasc.lockheed.com
(David McReynolds) writes:

>> 3. If I want full duplex, do I need 2 antennas at each end or can
>> one serve as a bidirectional with 2 separate frequencies used?
>
>By definition full-duplex is the use of 2 frequencies. You don't have 2
>telephone lines coming into you full duplex modem do you?

Well, not exactly. V.32 modems use the same frequency carrier in both directions, but employ adaptive echo cancellation to avoid reception of their own outbound carriers.

And also not exactly for RF either. At microwave frequencies, E and H planes' polarization orientation is easily controlled. We often use microwave links that have two outbound channels on the same carrier frequency, one carrier with vertical polarization, the other with horizontal polarization.

By its nature, a Gunnplexer is a full duplex device. The local

carrier oscillator is used for injection for the local oscillator. By offsetting the two ends of the link by 70 MHz, you'll obtain a 70 MHz FM IF output from the Gunnplexer's detector. You can run this into an off-the-shelf 70 MHz IF system for demodulation. For penny pinching amateur projects, you can offset the two link ends by about 100 MHz, then use a plain Jane everyday FM radio for your demodulator. If you really want to get fancy, you can lock your Gunnplexer modulation system to the receiver's AFC voltage for full loop control.

There is a nice Amateur allocation at 10.0 - 10.5 GHz, and commercially available 10.55 GHz Gunnplexers are easily tuned to this range by simple adjustment of a tuning slug screw. The amateur allocation is available to all but Novice license holders. You can operate there by taking two relatively easy multiple choice examinations (in the US). The amateur service is limited to strictly non commercial applications and operators must not operate in broadcast mode, transmit music, or transmit profane material, etc.

--

Bill Mayhew NEOUCOM Computer Services Department
Rootstown, OH 44272-9995 USA phone: 216-325-2511
wtm@uhura.neoucom.edu amateur radio 146.58: N8WED/AA

Date: Fri, 11 Jun 1993 15:32:26 GMT
From: swrinde!cs.utexas.edu!math.ohio-state.edu!caen!usenet.cis.ufl.edu!
usenet.ufl.edu!zeno.fit.edu!zach.fit.edu!ree88132@network.UCSD.EDU
Subject: Digital microwave project
To: info-hams@ucsd.edu

In article <dmcreyno-110693082520@134.5.142.4> dmcreyno@hercii.lasc.lockheed.com
(David McReynolds) writes:

>
>Hey, has anyone got a match?
>
>In article <C8FqJs.1Hr@zeno.fit.edu>, ree88132@zach.fit.edu (Keith Ledig)
>wrote:
>>
>> I am about to embark on a project that involves the use of microwaves
>> to transfer digital data. Not being very experienced in microwave
>> technology I have a few questions to ask the microwave gurus. First,
>> a little background: This project will link two computers together
>> through their serial ports at initially 9600 baud but later at speeds
>> of up to 115K baud. The eventual goal is to use SLIP through this

>> connection to get onto the network. The distance will be approx.
>> 10 to 15 miles.
>>
>> 1. Where is a good place to get cheap microwave components from?
>> 2. What frequencies can be used for this microwave link?
>
>Typically, we use Microwave frequencies for Microwave Links.
>

How about frequencies (ie. 2.125 Ghz, etc)

>> Are there allocated frequencies for such experimentation and
>> do they require a license?
>
>You better believe it! You have to have an operator's license. That
>requires a test. Also, you will have to have an engineering study done.
>Those cost big bucks.

I think you miss my point. I am asking if there are any HAM bands
that are good for digital microwave or experimental bands that the
Govt. has assigned.

>
>
>> 3. If I want full duplex, do I need 2 antennas at each end or can
>> one serve as a bidirectional with 2 separate frequencies used?
>
>By definition full-duplex is the use of 2 frequencies. You don't have 2
>telephone lines coming into you full duplex modem do you?
>

My intent of this question is exactly as stated. Can I use one
dish/horn as a transmitter AND a receiver at the same time
simultaneously. The reason I ask is because we have a couple
horns here that are either a transmitter or a receiver. The
diode in the center of the horn does only one job.

>> 6. Has this been done before with personal/amateur setup?
>
>Yeah, I just spent \$50,000 and got mine last week.

Not what I had in mind. I was thinking of a more affordable
setup. From the sound of your reply you really have no clue as
to what I intend to do.

>> 8. What security considerations are necessary? I will probably want
>> to encrypt/scramble so eavesdroppers can't get system passwords etc.

>> Is there data encryption on a chip available?

>

>Now what good would that be? I got this here data encryption on a chip. Now
>I'm sure no one else is going to buy this same chip. Seriously, given your
>total lack of ignorance and technical expertise I doubt anyone would be
>interested in eavsdropping on any of your conversations.

I take this as your good sense of humor. A data encryption chip that would be considered useful would be one that is programmed so that the method of encryption will vary with each user. It's analogous to a combination lock or key lock with programmable tumblers.

>Are you typical of the student body at Florida Institute of Technology?
>Take your school project elsewhere. We don't do your homework for you in
>this news group.

>

This is not "homework". This is a project that I have initiated and can be more accurately characterized as "research".

>David McReynolds
>Hercules II C-130J
>Integrated Digital Avionics
>Lockheed Aeronautical Systems Company, D/70-D4, Z/0185
>Marietta, Georgia 30063
>
>e-mail dmcreyno@hercii.lasc.lockheed.com
>(404)494-0916

Gee, Lockheed must be a great company to work for. Even the janitors get access to internet.

Date: 11 Jun 93 13:10:35 GMT
From: news-mail-gateway@ucsd.edu
Subject: Field Day Power.
To: info-hams@ucsd.edu

If you want reliability, go Diesel! [you also get a complete absence of ignition noise...]

Many of the domestic/hobby-type gasoline generators are not likely to survive being operated at more than about 50% of their rated load for any length of time (they overheat, burn exhaust valves, and cremate the electrodes off the end of the spark plug if run with wide open throttle); 1000 hours will see you tearing down the engine & replacing most of it, but with

My favorite generator [alas no longer available] used a 3-cylinder water-cooled YANMAR diesel, coupled to a MARKON self-regulating alternator; it would do 110V at 5KVA continuous duty; under typical field-day conditions, it just loafes along; the lights stay bright when someone plugs the toaster in!

-Pete Lucas G6WBJ pjml%swmis.nsw.ac.uk@nsfnet-relay.ac.uk [Internet]
pjml@uk.ac.nsw.swmis [JANET; UK Only!]
Politically INcorrect! and Proud of it!

```
In article ILt@netcom.com, srtest@netcom.com (Sunrise Test Systems) writes:
> I just called Yaesu. They said to send a photocopy of my receipt to
> the following:
>
>     Yaesu America
>     Attn: John Lynn
>     17210 Edwards Rd.
>     Cerritos, Ca. 90701>
> The technician said that the problem is related to the different frequencies
> of the Japanese vs. U.S. ham bands. I didn't ask him to explain, but I think
> he meant bandwidth.
>
> -----
> Nick Barbieri (KB6QI)
> Sunrise Test Systems
> 2730 San Tomas Expressway, Suite 200
> Santa Clara, Ca. 95051
> (nick@srtest.com)
```

Differences are FM voice is 430-440 with repeaters outputs at 439.00 and up with same -5mhz split, all use 88.5 tone. Simplex calling freq is 433.000 2m is 144 - 146 with Calling Freq 145.000. Don't think there are any 2m repeaters, at least I've never heard any in Tokyo. CQ is called

on the calling frequency and people move off to an agreed upon simplex
freq almost always.

Bob KD1GG, 7J1AIS

Date: 11 Jun 93 12:36:00 GMT
From: news-mail-gateway@ucsd.edu
Subject: FTP File Compression Question
To: info-hams@ucsd.edu

When hunting around the internet for FTPable files, I encounter three types of
compressed-file extensions: .zip, .arc, and .Z. I have unzip and dearc
programs, but nothing to unZ. Can anyone give me an FTP route, and a file
name, for a program to uncompress a <filename>.Z file?

steve - W3GRG
mosier@iris.uncg.edu dit dit

Date: Fri, 11 Jun 1993 13:10:13 GMT
From: usc!howland.reston.ans.net!usenet.ins.cwru.edu!ukma!rsg1.er.usgs.gov!
resdgs1.er.usgs.gov!tbodoh@network.UCSD.EDU
Subject: Ham radio in TV shows
To: info-hams@ucsd.edu

In article <m1f1tmINNrn3@exodus.Eng.Sun.COM>, wdh@oversteer.Eng.Sun.COM (Dennis
Henderson) writes:
|> The TV show "Wings" used an early 50's Hallicrafters S20-R
|> receiver as a transceiver. Spotted this immediately as I
|> used a S20R with a Heath Q-multiplier for (1/2 of) my first novice
|> rig in the early 70's.
|>
|> Of course the Professor on Giligan's Island could turn their
|> receiver into all kinds of neat stuff including a transmitter.
|>
|> Let's not get over critical of the media's usage of communication
|> gear. Entertainment is make believe. They usually use
|> inappropriate bicycle and cars for racing applications-so their
|> mistakes are by no means limited to radio gear.
|>
|> ...Dennis Henderson, N6TTW (formerly WN0ZIJ and WN6AEG(?-its been a long time))

--
I just love how well tires squeel on gravel and how well silencers work on
revolvers - in movies...

++++++
+ Tom Bodoh - Sr. systems software engineer
+
+ USGS/EROS Data Center, Sioux Falls, SD, USA 57198 (605) 594-6830 +
+ Internet; bodoh@dgg.cr.usgs.gov (152.61.192.66)
+
+ "Welcome back my friends to the show that never ends!" EL&P
+
++++++

Date: 11 Jun 93 12:19:27 GMT
From: news-mail-gateway@ucsd.edu
Subject: Handi-Ham Address
To: info-hams@ucsd.edu

The address for the Handi-Ham organization is:
Courage Center
3915 Golden Valley Rd.
Golden Valley, MN 55422-4298

W2EQW.wbst845@xerox.com
Packet: W2EQW @ WB2WXQ.WNY.NY.USA.NOAM
SNAIL MAIL: 120 Lehigh Ave., Rochester NY 14619-1627

Date: 9 Jun 93 09:55:25 EDT
From: sdd.hp.com!saimiri.primate.wisc.edu!news.crd.ge.com!sunblossom!ge-dab!
cho006.cho.ge.com!wright_t@network.UCSD.EDU
Subject: HTX-202 error mode
To: info-hams@ucsd.edu

In article <m17cftpINN8d@news.bbn.com>, levin@bbn.com (Joel B Levin)
writes:

> Twice this week I've had to reset the transceiver and reenter the
> memory contents because it somehow got into "ER-1" mode: it blinks
> "ER-1" in the display and beeps every second or so and nothing I've
> found gets it out of that mode except a complete reset, which
> unfortunately also clears all the memories. It's almost 11 months old
> (I forget whether it had a 3-month or 12-month warranty). It comes
> up after reset at 144.200 Mhz, which according to some postings here
> means it's an early copy.
>
> Question is: did the change (which makes it come up at 146.000 Mhz)
> fix a bug that would put an end to this "ER-1"? Or is the radio just

> broken and I should send it in to be fixed? Or do all HTX-202s do
> this once in a while and I should just live with it? (It's happened
> maybe four times altogether; this week was the first in many months.)
>
> Thx & 73 / JBL KD10N
> =
> Nets: levin@bbn.com |
> pots: (617)873-3463 | "I gotta go."
> KD10N (@KB4N.NH.USA) | -- I. Shoales

My brother and I both have the HTX-202. His went into this 'ER1' mode when we were ready for some good rag-chewing one day. He called a friend of his at the R/Shack repair center and was told to turn it off then back on while holding the function key and the m-clr key (#9). The technician told him that this error message indicates that the backup battery will soon need to be replaced. His radio is still working fine after 2 months without replacing this battery. Take it for what it's worth.

Tim Wright --- KD4Z00

Date: Fri, 11 Jun 1993 13:47:53 GMT
From: sdd.hp.com!ux1.cso.uiuc.edu!newsrelay.iastate.edu!news.iastate.edu!
tarjan@network.UCSD.EDU
Subject: Info request: Kenwood TH-78a
To: info-hams@ucsd.edu

And how good are they (I know they look cool :>)

And has anyone here used their alpha numeric pagin function?
Is it useful?

Thanks

Please post response.. others might be interested

tarjan@iastate.edu

--
-----BEGIN PGP PUBLIC KEY BLOCK-----
Version: 2.1

mQCNAiuSvfsAAAAEEANedvpkX74z4wwGW9f1M10bhLHL6UNbO8mpH0q1UIxaKsfYt

Date: 11 Jun 93 16:04:31 GMT
From: news-mail-gateway@ucsd.edu
Subject: Intermodulation, dummy-load antennas and HT's
To: info-hams@ucsd.edu

Facts:

Most modern HTs are subject to intermodulation.
Most rubber-duck type antennas are hopeless.
Most hams want the best of all worlds.

Seems to me, a possible solution is to have a wide-band antenna (normal-mode helical encased in lossy carbon-loaded rubber) for when you want wideband transmit/receive operation, and an alternative, sharply-tuned, efficient antenna for cutting down on intermod. and getting best transmit performance.

Has anyone considered looking into sharply-tuned antennas for HT's?
(a 1/4-wave whip with some sort of high-Q matching network at its base..)

Time for experimenting.... a length of copper pipe, soldered to the outside shell of a BNC plug, with a silver-plated 'helical filter/matching network' stuffed inside, coupled to a 1/4-wave whip, could just be what's needed to kill intermod. and improve transmit performance.

-Pete Lucas NERC Computer Services England g6wbj@gb7sbn.gbr.eu
 pjml%swmis.nsw.ac.uk@nsfnet-relay.ac.uk [Internet]
 pjml@uk.ac.nsw.swmis [JANET: UK Only!]
 Death is Nature's way of telling you to review your lifestyle.

Date: 10 Jun 1993 17:26:34 GMT
From: sun-barr!news2me.EBay.Sun.COM!exodus.Eng.Sun.COM!appserv.Eng.Sun.COM!
newbirth!rja@decwrl.dec.com
Subject: LOWE SHORTWAVE USERS MAILING LIST forming.
To: info-hams@ucsd.edu

Announcement:

LOWE SHORTWAVE USERS MAILING LIST

We are starting a mailing list to discuss Lowe shortwave sets. The list will allow discussing aspects of these sets that are not of general interest. Owners, prospective owners, and any others are all welcome.

A mailing list serves approximately the same purpose as that of a newsgroup, but it works entirely by e-mail. Initially the list will use only the "reflector" method, which means you receive messages when they're sent, allowing a dialog among those sending messages. A digest format may be added later.

The HF-150 mailing list will be maintained by Robert Allen. Following are the two email addresses for using the list:

hf150-request@batcomfs.Eng.Sun.COM - to be added/deleted to list

hf150@batcomfs.Eng.Sun.COM - to post to the list

--

Robert Allen, rja@sun.com DISCLAIMER: I said it, not my company.

Samuel Adams: Brewer, Patriot.

Date: 11 Jun 93 14:37:20 GMT
From: usc!wupost!udel!bogus.sura.net!news-feed-1.peachnet.edu!concert!duke!
news.duke.edu!ee.egr.duke.edu!jbs@network.UCSD.EDU
Subject: N connectors for RG-58?
To: info-hams@ucsd.edu

Thanks for all the replies, mostly about the N connector for RG-58 being available at Radio Shack.

I called Radio Shack yesterday before posting that message, and the salesidiot a) didn't even know what an "N" connector was, b) after "checking" said that RS didn't make an N connector for RG-58, and c) said that RS didn't make a PL-259-to-N adapter.

a) was probably to be expected, and b) and c) were flat out wrong.

Just more fuel for the hate-RS-and-wish-to-hell-there-were-another-game-in-town fire.

I ended up buying the RG-58 N connector, and it seems to work fine. They indeed had no PL-259/N adapter, but RS does sell them.

-joe KD4LLV

--

You spend the night
Like you were spending a dime
- Lyle Lovett

Date: Fri, 11 Jun 1993 12:25:25 GMT
From: sdd.hp.com!apollo.hp.com!hpwin052!hpqmoea!dstock@network.UCSD.EDU
Subject: Signal Strength Formula?
To: info-hams@ucsd.edu

I don't believe there are any general formulae for atmospheric effects, but there are some empirical things suited to specific and limited circumstances. This means that you need to have a specific part of the spectrum in mind in order to select an approximate formula.

Beware of the so-called freespace path loss formulae. In most textbooks they have been spoilt by including a factor really belonging to the receiving antenna.

If you know the ERP in the wanted direction, then you can easily arrive at the power density at the receiving site. A transmitter with 1W of ERP in your direction is indistinguishable from a 1 W transmitter at the same position putting 1W into a lossless, perfect omnidirectional antenna. So, consider that your ERP is uniformly spread over the surface of a sphere of radius equal to your path length and it is simple to calculate the power density at the end of your path. What electrical power your receiving antenna creates from this is a function of its capture area and losses.

Unfortunately, the world seems fixated on halfwave dipoles, and half wave dipoles have different capture areas for different frequencies. A halfwave dipole for a lower freq is bigger, so no-one should be surprised that it captures more energy for a fixed energy density of incoming field. The result is that path loss equations are written in terms of power out of a halfwave dipole, and so have a term inversely proportional to frequency. No wonder folk don't seem to form a clear mental picture of path losses.

Cheers

David

Date: Fri, 11 Jun 1993 03:39:07 GMT
From: swrinde!cs.utexas.edu!csc.ti.com!tilde.csc.ti.com!m2.dseg.ti.com!ernest!cmptrc!carter@network.UCSD.EDU
Subject: Velocity of Light
To: info-hams@ucsd.edu

In article <9306071609.AA14553@ucsd.edu> ST1860@SIUCVMB.SIU.EDU (Gary R. Smith

KE9MI) writes:

>Hi--

>

> For what ever its worth...the most accurate speed I have seen, thanks to some Astronomy types is 29979245800 centimeters per second in a vacuum.

Ahoy, Gary!

FYI, that is a precise measure. The National Institute of Standards and Technology (formerly the National Bureau of Standards) defines the meter as the distance traversed by light in vacuo in 1/299792468 seconds. That was as of the mid 80's, I believe.

Cheerio!

--

Carter R. Bennett, Jr. - Scientist | "Oh my God! I _AM_ a nerd!!!"
carter@scilab.lonestar.org - home | - C. Bennett, Sept 25, 1992, after
carter@cmptrc.lonestar.org - work | realizing he had been talking about
KI5SR | "market availability of preconfigured Toll-House cookies."

Date: Fri, 11 Jun 1993 13:08:17 GMT

From: usc!howland.reston.ans.net!usenet.ins.cwru.edu!ukma!rsg1.er.usgs.gov!

resdgs1.er.usgs.gov!tbodoh@network.UCSD.EDU

To: info-hams@ucsd.edu

References <1v7bot\$bds@jericho.mc.com>, <1993Jun10.144205.2775@rsg1.er.usgs.gov>,
<jfhC8F7qn.G9H@netcom.com>

Subject : Re: The ITU phonetic alphabet

In article <jfhC8F7qn.G9H@netcom.com>, jfh@netcom.com (Jack F. Hamilton) writes:

|> tbodoh@resdgs1.er.usgs.gov (Tom Bodoh) wrote:

|>

|> >I frequently have to use phonetics when asking for tapes to be sent up from

|> >our tape library - and I like to use 'psuedo' for 'p'. That usually

|> >confuses the hell out of them - but I always get the right tape.

|>

|> "I'd like tape PKM, please - that's Pseudo Knowledge Mnemonic."

|>

|> --

|>

|> -----

|> Jack Hamilton jfh@netcom.com kd6ttl@n0ary.#nocal.ca.us.na (AMPR)

|> Post Office Box Box 281107 San Francisco, California 94128 USA

--

I like it - here's the ones I have so far, fill in the blanks;

a	
b	
c	
d	
e	
f	
g	gnaw
h	
i	
j	juan
k	knowledge
l	
m	mnemonic
n	
o	
p	pseudo
q	
r	
s	
t	
u	
v	
w	
x	xylophone
y	
z	

```

+++++
+ Tom Bodoh - Sr. systems software engineer
+
+ USGS/EROS Data Center, Sioux Falls, SD, USA 57198      (605) 594-6830      +
+ Internet; bodoh@dgg.cr.usgs.gov (152.61.192.66)
+
+ "Welcome back my friends to the show that never ends!" EL&P
+
+++++

```

Date: Thu, 10 Jun 1993 02:12:52 EST
From: anomaly.sbs.com!kd1nr!news@uunet.uu.net
To: info-hams@ucsd.edu

References <C8BKqx.B6s@boi.hp.com>, <1v4s03\$p2k@tamsun.tamu.edu>,
<C8DBps.8st@ucdavis.edu>
Subject : Re: Blue Language Repeaters

ez006683@othello.ucdavis.edu (Daniel D. Todd) writes:

> First off, I could never imagine myself using that kind of language on a
> repeater. I don't think it is a forum on which I want to be heard using
> such a vocabulary. I certainly know the words,ask any of the local
> aircraft mechanics I ocassionally hang out with.
>
> Second, although I don't think it belongson the airwaves I don't take it
> upon myself to tell others what they can or cannot say on the airwaves.
> Besides I have an FT-470 with only 18 2m memories why would I waste one on
> a "Blue Repeater"?

Hey Todd, did you forget that the radio has a VFO on it? I mean,
memories aren't the only thing for a ham to use.

But in all reality, you bring up a good point. If you don't want to hear
it, don't tune it in or shut the radio off. That's why they put those
great controls on em'.

Tony

```
-----  
Tony Pelliccio kd1nr/ae    "Usenet is like a herd of performing elephants  
*!*!*!*!*!*!*!*!*!*    with diarrhea -- massive, difficult to  
system@garlic.sbs.com     redirect, awe-inspiring, entertaining, and a  
----- source of mind-boggling amounts of excrement  
                           when you least expect it." --spaf (1992)
```

End of Info-Hams Digest V93 #714
